**Stewards of the Earth: modern perception of the importance of conservation in younger generations**

**An Honors Thesis (HONR 499)**

**By**

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May 2018

**Ball State University**

**Muncie, Indiana**

**Expected Date of Graduation**

May 2018

Abstract

The following study was carried out in order to determine the perception of the importance of the environment in younger generations. The study included interviewing students of different ages and genders at the Roy C. Buley Center in Muncie, Indiana. These students ranged in grades from Kindergarten to 5th and were interviewed in groups of no more than 4 with the same questions. Each response given by a student was ranked on a scale from 1 to 3. One meaning that the statement showed that the student did not believe that the environment was beneficial to us humans, two meaning that the statement showed knowledge of the environment being beneficial, but showed no indication the student knew why, and three meaning that the statement proved that the student knew why the environment was beneficial. It was hypothesized that the majority of the students would be able to recognize that the environment was important, but would not be able to determine why, meaning that the majority of the statements would rank 2 on the scale. This hypothesis was supported for fourth and fifth graders that were interviewed, as well as second and third grade boys, but did not produce significant enough results for the other three groups. From these results, it was determined that students at the Roy C. Buley Center grades 4-5 did know that the environment was important to protect but were not able to identify why. From this, we can conclude that the modern perception of these interviewed students does not include the knowledge of exactly how the environment benefits human beings. The lack of this knowledge may prevent these future generations from making positive impacts on the environment and is, therefore, something that should be addressed.

Acknowledgements

I would like to thank Dr. Islam for being my advisor and Dr. Robinson-Hill for her assistance in my project. Their patience and encouragement throughout this process has been a real blessing and I would not have been able to do this without them. Thank you so much!

Project analysis statement

This project was a study of the perception of conservation of nature and the environment in younger generations. It involved interviewing students at the Roy C. Buley Center in Kindergarten through 5th grade. The result of these interviews were statements, each given a rank based on how they indicate the child's understanding of the environment. To carry out this process, I would go to the Roy Buley Center every Friday and interview a few groups of students no larger than 4 students at a time. The interviews would be no longer than 15 minutes and would be recorded for later transcription. This study is significant in hypothesizing the effect these children will have on future conservation. Since these students are the future workers and leaders of our state and our world, how they perceive the environment now can give hints to how it will be managed in the future.

## Introduction

The future of environmental conservation is an increasingly important aspect in the world. The environment provides much needed services that human beings need to survive. From natural resources used to create every day products to the air we breathe, the environment provides for all. Human beings also have the ability to affect the environment both negatively and positively. Carbon emissions from vehicles can cause temperature changes, affecting a wide variety of ecosystems. At the current population growth rates, fuel demand is hypothesized to increase by 50%, yet emissions will need to decrease by 80% (Wagner, Ross, Foster, and Hankamer 2016). Yet, it is through human beings that law and regulations such as the Clean Air Act are put into place to protect the environment from these damaging factors. The question that often comes up is what will the future look like? How will future generations help or harm the environment? While this is impossible to know for sure, the children who will become our future generations can give an idea. The children in the Muncie area are the future of Muncie, and by extension, our world. What they believe and understand about the importance of the environment now can have an impact on the affect they might have on it in the future. The purpose of this study was to gain an understanding of the perception of conservation in younger generations. In today's technological society in which information is at the user's fingertips in seconds, it was believed that the children would understand that the environment is important, but they may not be fully able to grasp why. This study interviewed students between five and twelve years of age at the Roy Buley center in Muncie, IN. The results were able to give an idea of if the children believe that the environment is important as well as why they believe so.

Studies done in the past indicate that a student's outline of the environment is usually incomplete and full of misconceptions (Shepardson, Wee, Priddy, &Harbor 2007). Students also tend to associate the environment with animals and less with the other aspects of the environment (Shepardson, Wee, Priddy, &Harbor 2007). Students in different locations also tend to conceptualize

the environment differently based on their location due the ideal factors of an area outside of the known (Shepardson, Wee, Priddy, &Harbor 2007). In Muncie, Indiana, the common conception is based off of pristine forests not found in the area and would also focus on the animal aspect rather than the benefits for humans. Based on this information, a hypothesis was made that the interviewed students would be able to state that the environment was important and should be protected, but not identify why.

Materials and Methods

Prior to the study, consent was obtained from parents via the parental consent form. The children were addressed and introduced to the project. It was helpful to be in touch with an individual that is familiar working with the children and knows them to help with the introduction. After the introduction, they were given a parental consent form to take to their guardians. Those who returned their forms were identified as participants for the project. Any children that did not return a signed form were not included in the project. The consent forms were then divided by age and put in alphabetical order for filing. The children of similar ages were grouped together by gender as well in groups no larger than 4 to reduce the variability of the group. The students were then given a child assent form to sign. If a subject refused to sign the form, they could leave and were removed from the study. Each student in the group was randomly assigned a number (student 1, student 2...) to differentiate responses while keeping the responses confidential. First, they were reintroduced to the topic of nature and the environment, then they were asked a series of premade questions relating to nature and the environment and how they believe it is important to them. These questions and answers were recorded on a recording device and stored to be transcribed later. A second record was kept during the interview to confirm which student spoke when. Once the interview was over, the data was collected, and the experiment was repeated on a new group of kids. Any kids who did not wish to participate could continue with day's activities.

To collect data, each statement by an individual student was ranked on a scale of 1 to 3. One meant that the statement indicated that the student did not think nature to be important. Two meant that the statement indicated that the student believed nature to be important but was not able to identify why. Three meant that the statement indicated the belief that nature is beneficial to humans and why. For each individual student, the average of these statements was calculated and recorded. The students were divided into groups based on age and gender, and an ANOVA test was run on the groups in order to determine the similarities and differences between ages and genders. The groups were girls grades K-1, girls grades 2-3, girls grades 4-5, and the same age groups for boys

Results

Table 1. T-test for the average rank of student statements for girls (G) and boys (B) grades K-1, 2-3, and 4-5. P-values less than 0.05 indicate a significant support of the hypothesis. The null hypothesis is that the means are equal to 2, and the alternate hypothesis is that the means do not equal 2.

| Sample | T-Value | P-Value |
|---|---|---|
| Average G K-1 | -2.09 | 0.075 |
| Average G 2-3 | 1.40 | 0.234 |
| Average G 4-5 | 2.71 | 0.035 |
| Average B K-1 | -0.51 | 0.636 |
| Average B 2-3 | 2.38 | 0.038 |
| Average B 4-5 | 5.55 | 0.012 |

Table 2. ANOVA test for the average rank of statements for girls (G) and boys (B) grades K-1, 2-3, and 4-5. P-values less than 0.05 on the Welch's test show a significant difference in the means between groups. The null hypothesis is that all means are equal and the alternative hypothesis is that all means are equal. Equal variance was not assumed for this test.

Welch's Test

| Source | DF Num | DF Den | F-Value | P-Value |
|---|---|---|---|---|
| Factor | 5 | 12.6218 | 5.66 | 0.006 |

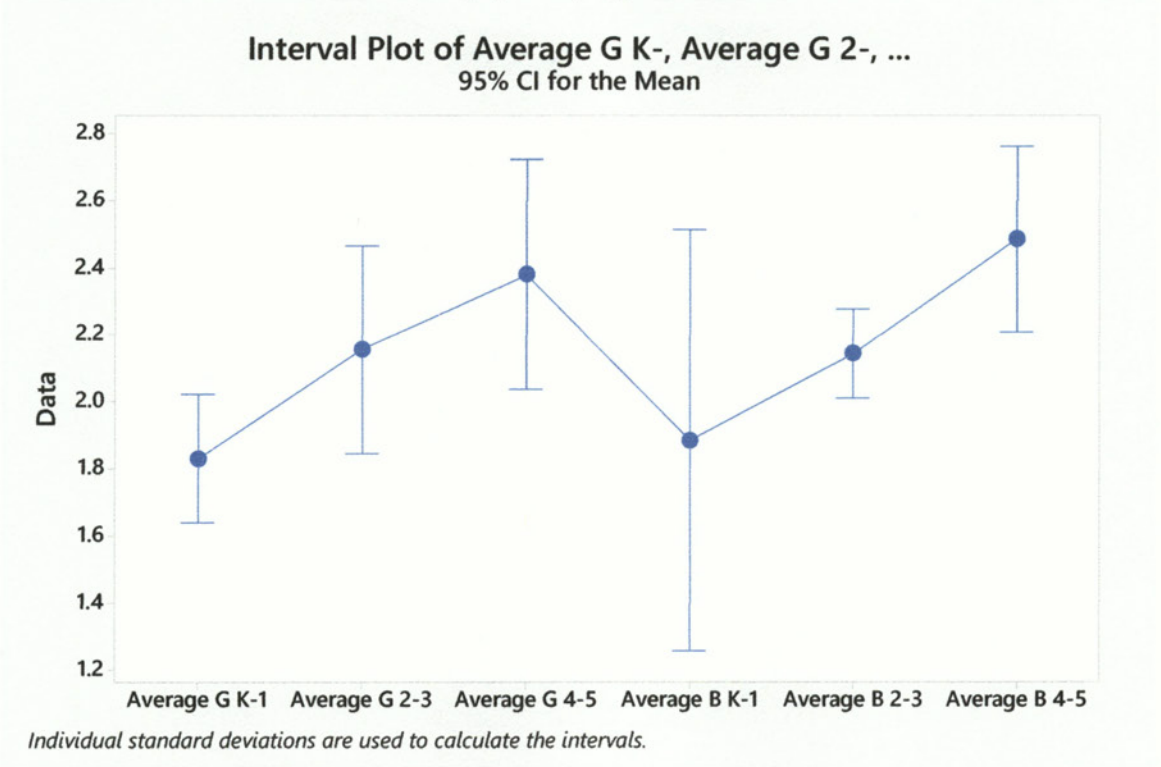
Games-Howell Pairwise Comparisons

Grouping Information Using the Games-Howell Method and 95% Confidence

| Factor | N | Mean | Grouping | |
|---|---|---|---|---|
| Average B 4-5 | 4 | 2.4850 | A | |
| Average G 4-5 | 7 | 2.380 | A | B |
| Average G 2-3 | 5 | 2.156 | A | B |
| Average B 2-3 | 11 | 2.1427 | A | B |
| Average B K-1 | 5 | 1.884 | A | B |

Average G K-1 8 1.8300 B

*Means that do not share a letter are significantly different.*




*Individual standard deviations are used to calculate the intervals.*

Figure 1. An Interval Plot showing the relation in results between the different age and gender groups of students participating in the study.

Discussion

The average score of each student age and gender group did trend toward the hypothesis, but only boys in grades 2-3 and 4-5 and girls in grades 4-5 showed a significant support of the hypothesis ($p=0.035$ for girls 4-5, $p=0.038$ for boys 2-3, and $p=0.012$ for boys 4-5). The boys in grades 4-5 showed the highest average score of 2.485, while the lowest score was found in the K-1$^{st}$ grade girls with an average of 1.830. The ANOVA test proved these to groups to be the only groups with a significant difference ($p=0.006$). The remaining groups had average scores that were not significantly different. The significant difference between the two groups is most likely due to the age difference between the two. The oldest boy group has been in school longer and have had more classes through which to learn about the environment then the youngest girl group. As a result, they were able to answer the

questions more accurately and knowledgeably. There was also a trend in the data that shows the younger age groups have lower average scores than the older age groups across the board. The average for grades 4-5 were above 2.380, the average scores for grades 2-3 were above 2.1427 and below 2.156, and the average scores for grades K-1 were below 1.884. There was, however, less of a correlation between different genders. While the average scores for boys were greater in grades K-1 (B:1.884, G:1.830) and 4-5 (B:2.485, G:2.380), the average scores for girls were greater in grades 2-3 (B: 2.1427, G:2.156). These averages besides the two extremes, though, do not have a large enough significant difference for anything to be concluded.

The Null hypothesis was that the students know that the environment is important but are not able to identify reasons for its importance. This hypothesis is supported in all students grades 4-5 ($p=0.012$ and $p=0.035$), as well as boys in grades 2-3($p=0.038$). The remaining age groups did not provide enough data to support the hypothesis nor reject it ($p=0.075$ for girls K-1, $p=0.234$ for girls 2-3, and $p=0.636$ for boys K-1). This could have been due to differing sample size numbers and the relatively small sample size.

Possible errors in the results could be due to the uneven sampling of the groups. In order to obtain the highest amount of data, the students had to be divided somewhat unevenly, so, for example, the boys 4-5$^{th}$ had a sample size of 4 while the boys 2-3 had a sample size of 11. Younger students also had more trouble focusing on the questions, so they had less statements in general (Because most of the time they would tell stories). Some students were also less inclined to answer questions because they were shy or distracted by others in the room. As expected, a lot of students would have an incomplete or inaccurate conception of the environment as a whole. The majority of them focused on the wildlife aspect, although an amount of the 2-5$^{th}$ graders did focus on the benefits of plants as well. A majority of K-1 students would often confuse wildlife with pets or livestock. This often led to tangents on information unrelated to the topic at hand. These unrelated topics were often not ranked, since they

did not address the questions and could possibly skew the data. Often, to get a student to talk, the question why would have to be asked. And some of the shyer students would only talk when very specific questions were asked. Therefore, a lot of the errors cams from student interactions with each other. They would often distract one another or go off another's statement rather than make their own.

Conclusion

The results of this study support the hypothesis--that students are able to acknowledge that nature and the environment is important, but not able to identify why--for three of the groups. Other groups did not significantly prove or disprove the hypothesis. These results show that students in the Muncie area are being successfully taught that nature and the environment are important, but they are not all processing the reasons for this importance. Of course, some individuals were knowledgeable on the reasons that nature is important, but others were not able to fully explain why. This ranged with the amount of education in each group, but the majority at least understood that the environment needed to be protected. This much gives us hope for the future. If future generations are raised knowing of the importance of the environment, they are more likely to work toward protecting it. However, if they are unsure of why it is important, they may not be able to benefit it in the right ways. This study supports the need to emphasize the reasons that the environment is important for younger generations. Knowing this information could make a lasting impact on the world.

To possibly further this study, more age groups can be studied to determine the results of further education on the knowledge of the environment. Also, a larger sample size could be obtained from different populations within the state. This would give a wider variety of students from different backgrounds and upbringings and create a more accurate representation for the Indiana population. Another possibility is to compare students from different areas to see if the learning environment in certain areas are more catered to teaching about environmental benefits. This could be done on even a

national or global level with the right resources. I believe such a study could be beneficial in hypothesizing the impact of future generations on our world.

Works Cited

Shepardson, D. P., Wee, B., Priddy, M., & Harbor, J. (2007). Students' Mental Models of the Environment. Journal of Research in Science Teaching, 44(2), 327-348

Wagner, L., Ross, I., Foster, J., & Hankamer, B. (2016). Trading Off Global Fuel Supply, CO2 Emissions and Sustainable Development. *Plos One, 11*(3).

BALL STATE UNIVERSITY

Office of Research Integrity
Institutional Review Board (IRB)
2000 University Avenue
Muncie, IN 47306-0155
Phone: 765-285-5070

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|---|---|
| DATE: | February 19, 2018 |
| TO: | Sarah McConkey |
| FROM: | Ball State University IRB |
| RE: | IRB protocol # 1095921-1 |
| TITLE: | Stewards of the Earth: modern perception of the importance of conservation in younger generations |
| SUBMISSION TYPE: | New Project |
| ACTION: | APPROVED |
| DECISION DATE: | February 7, 2018 |
| EXPIRATION DATE: | February 6, 2020 |
| REVIEW TYPE: | **Expedited:** This protocol had been determined by the board to meet the definition of minimal risk. |

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The Institutional Review Board has approved your New Project for the above protocol, effective February 7, 2018 through February 6, 2020. All research under this protocol must be conducted in accordance with the approved submission and in accordance with the principles of the Belmont Report.

**Review Type:**

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|---|---|
| | **Category 1:** Clinical studies of drugs and medical devices |
| | **Category 2:** Collection of blood samples by Finger stick, Heel stick, Ear stick, or Venipuncture |
| | **Category 3:** Prospective collection of biological specimens for research purposes by noninvasive means |
| | **Category 4:** Collection of data through Non-Invasive Procedures Routinely Employed in Clinical Practice, excluding procedures involving Material (Data, Documents, Records, or Specimens) that have been collected, or will be collected solely for non-research purposes (such as medical treatment or diagnosis) |
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| X | **Category 6:** Collection of Data from Voice, Video, Digital, or Image Recordings Made for Research Purposes |

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| X | **Category 7:** Research on Individual or Group Characteristics or Behavior or Research Employing Survey, Interview Oral History, Focus Group, Program Evaluation, Human Factors, Evaluation, or Quality Assurance Methodologies |
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**Editorial Notes:**

1. Approve

**As a reminder, it is the responsibility of the P.I. and/or faculty sponsor to inform the IRB in a timely manner:**

- when the project is completed,
- if the project is to be continued beyond the approved end date,
- if the project is to be modified,
- if the project encounters problems, or
- if the project is discontinued.

Any of the above notifications must be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb). Please reference the IRB protocol number given above in any communication to the IRB regarding this project. Be sure to allow sufficient time for review and approval of requests for modification or continuation. If you have questions, please contact Sandra Currie at (765) 285-5052 or slcurrie@bsu.edu.

In the case of an adverse event and/or unanticipated problem, you will need to submit written documentation of the event to IRBNet under this protocol number and you will need to directly notify the Office of Research Integrity (http://www.bsu.edu/irb) **within 5 business days**. If you have questions, please contact (ORI Staff).

Please note that all research records must be retained for a minimum of three years after the completion of the project or as required under Federal and/or State regulations (ex. HIPAA, FERPA, etc.). Additional requirements may apply.

D. Clark Dickin, PhD/Chair
Institutional Review Board

Christopher Mangelli, JD, MS, MEd, CIP/
Director
Office of Research Integrity